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THE CREED OF A BIOLOGIST

ALDRED SCOTT WARTHIN

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THE CREED OF A BIOLOGIST

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A Biologic Philosophy of Life

BY

ALDRED SCOTT WARTHIN, PH.D., M.D., LL.D.

Professor of Pathology and Director of the Pathological Laboratories
in the
University of Michigan, Ann Arbor

PAUL B · HOEBER · INC

NEW YORK · MCMXXX

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PUBLISHED FEBRUARY, 1930
REPRINTED MAY, 1930

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Printed in the United States of America

To Those of My Old Students Who Understood

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FOREWORD

IT is good to have had thirty-nine years of teaching. In such a length of time one comes happily into the teacher's real reward: the consciousness that here and there among one's students there are those, who, by the written or spoken word, acknowledge a certain debt of influence upon their lives, other than that of the purely didactive and instructive. To have an old student say that some idea expressed by the teacher took root within his mind and developed into a factor influencing his philosophy of life, cannot but conduce to humility on the teacher's part, a humility tinged with the warm glow of happiness in the thought of having aided another human being to find himself. As a teacher, I have always been fond of digressing from the beaten paths of pathologic knowledge into those of art, music, philosophy, religion, old books, or what not, seeking thereby to fix some point in the student's mind. Now at

the end of thirty-nine years I am surprised to find that what apparently counted most in my teaching were these digressions. They, all unsuspected, carried some degree of spiritual value, and it is from them that my greatest reward has come. Not from every student, but from those who *understood.* Now as I approach the end of my teaching career, I am doing what a number of these students have long importuned me to do: in this little book I am expressing my biologic Credo, my philosophy of life which has animated and directed my existence, which has given meaning to the Universe for me, and brought me peace of mind and happiness.

ALDRED SCOTT WARTHIN

Ann Arbor, Michigan
January, 1930.

THE CREED OF A BIOLOGIST

I

THE human mind demands a scheme of living. In all of the stages of his development Man has endeavored to justify the Universe to himself, or himself to the Universe, in some expressed form of religion or philosophy. He must have a plan or procedure by which he is enabled to adjust his individual existence to the unknown and uncertain conditions of the life in which he finds himself. During that mysterious journey from a birth out of the unknown to its close in death and entrance back again into the unknown, each human soul feels the need of a guiding map or chart, to enable him to escape the many dangers that beset his course, and to bring him into a safe haven at

the end. Without such a guiding plan of life he sails an uncharted sea to inevitable disaster. If the Universe cannot be rationalized for Man's mind, then all is chaos or ultimate despair. Suicide becomes the only logical alternative. Life, even under the most favorable material environment, is not so easy that it can be lived normally without some kind of mental adjustment and a definite plan of action. To the average person life is but one turn of the screw after another: perpetual adjustment must be made to each turn, and this becomes unbearable, if the whole process cannot be interpreted in terms of reason and logic. Such is the position in which the scientifically educated mind finds itself today. If, as often happens, that mind is no longer able to accept a religious faith founded upon dogma or so-called revelation, what alternative philosophy of life offers itself? If religion has come to mean nothing more than superstition or formal convention, then it is best discarded. An intolerable position is thereby created. The burning question remains,

what shall take the place of the old faith which to many has become only a superstition or empty form? *Something* must take its place, for the human soul adrift, that can see no reason or purpose in life, has but one of two choices to make: either to consider life not worth the trouble, or to use it for mere sensual gratification. Either alternative is equally unhappy. The first means cowardly annihilation without an attempt to play the game of life; the second means ultimate unhappiness through the inevitable burning of desire to ashes. *There remains the need to believe.* Man must have some kind of an answer to the eternal questions of Whither, Whence and Why. But what today shall one believe? Can a rational philosophy of life be created out of the knowledge which man possesses today, one that will make the universe credible and intelligible, one that will lift man above a mere material conception of life, and give him ideals of self-development to something higher and better than the mere animal? Does modern science offer any solution to

this problem? Have we in all our accumulated store of knowledge as to the nature and entity of energy and matter, of electrons and atoms, of the chemicophysical nature of the universe and of life, of evolution and heredity, no answer to this question? Is it not possible to postulate, on the basis of our scientific knowledge, a scientific and rational theory of living, a religion or philosophy based upon knowledge, rather than upon superstition, fear, or so-called faith or revelation! If this is not possible, then what avails our much-vaunted progress in science? It is either the truth which ultimately sets us free, or it but enmeshes us more securely in the net of circumstance, its end being folly and confusion. This, however, is not the case for some minds, who find in modern science just that foundation for a philosophy of living, for which the human soul is seeking: a rational and logical conception of the meaning of life and a guiding chart to its satisfactory accomplishment.

II

Fortunate is he who is able to adjust himself to life and to work out for himself a plan of action. Such philosophies of life are purely individual; they represent the sum total of the intellectual and moral development of the given person, the reaction of his ego towards the universe and their mutual relationship. Hence the history of religion and philosophy reflects the general evolution and progress of human knowledge. There has been an evolution in spiritual matters as well as in the purely intellectual and material. The two have progressed hand in hand. In general, the higher the intelligence of a given individual, the freer his philosophy from irrational and conventional formalism, and the better founded it is upon reason and fact. For each grade of intellectual development there exists a corresponding religious or philosophical phase, and each one of these may be, in its place, wholly adequate and satisfying. A man's religion cannot rise higher than his intellectual capacity; the more primitive the

man the more primitive his religious faith. From a belief in malicious spirits and the necessity for their propitiation, through that of fetich, idol and taboo, up through polytheistic to monotheistic beliefs, to the dogmas and conventions of the modern religions, there may be traced an unbroken line of evolutionary ascent, the character of the religious faith of any one people at any one time standing in direct relationship to the intellectual development of the period. The trouble with the present day situation is that intellectual progress has outstripped the religious. There are many individuals who can no longer accept the beliefs and dogmas of the existing religions or philosophies. They can see no proof of the existence of an anthropomorphic Deity; they have lost their conviction as to the immortality of the individual soul. The symbolisms and conventions of the churches have become worse than meaningless to them; they have come to regard them as representing a sort of intellectual dishonesty which they no longer find endurable. Yet many in casting

away old beliefs have done so prematurely; they have nothing to take their place; and they are, therefore, left at the mercy of a cold materialism or an equally unhappy modern epicureanism. Unfixed, unanchored, meaningless their lives become, and the end is despair. What can be more hopeless, more wretched than a human soul that has lost all faith, that has no plan of action and that can see no reason in the scheme of life! The majority of such unfortunates, we may believe, are to be found among those lacking in modern scientific training, to whom the thrilling facts of modern biology, of evolution, heredity and eugenics have made no appeal. And it is these very facts that constitute the foundation upon which a new religion or philosophy in keeping with the progress of knowledge can be based. In the analytic consideration of these great laws can be found the explanation of life, its reason, its goal, and the will to be and to do. Herein lies all of the material necessary for the satisfactory adjustment of the individual to the life in which he finds himself,

no longer in the rôle of an uninvited guest, but as one whose coming has been prepared for through all the ages that have gone before, the victor who has arrived at the top of an immortal evolutionary line, whose manifest duty it is to preserve this line for future immortality. Surely in these facts can be found the material for a rational philosophy of living, one that will satisfy the intellectual requirements of the modern thinker. Our knowledge has advanced to the point whereby the mystery of the Universe about us resolves itself into Law, and Life is rationalized. If what is demanded by those who have discarded their outworn religious beliefs are answers to the questions "Whence, Whither and Why," Modern Science can offer satisfactory answers to these primitive queries. Its answers are logical and rational. It points out a definite goal to the life-traveller, and the definite road by which that goal may be attained.

III

Of the ultimate origin of life we know nothing, as we know nothing of its ultimate

end. What concerns us is that immediate section of the stream of life in which we find ourselves. As far as our knowledge goes that stream may be said to be immortal, while we but represent mortal carriers of it in the form of the germ plasm within our bodies. The modern scientific conception of life is that it is a chemicophysical combination of energy and matter, manifesting itself in a material unit-form, the cell. Between the energy of the inanimate universe and that of the animate we can find but one essential difference; life has the power of taking in energy, storing it and releasing it. This gives to life its power to rise above its environment and to perpetuate itself within certain limits. This divine power of protoplasm to adjust itself to the constant changes going on in the earth's environment has made progress and evolutionary development possible. It seems probable that the first forms of life, or of its immediate predecessors, were molecular, of a colloidal nature, possessing the power of adding to their molecules and of storing and

releasing energy, but without the power to attain permanent form and to reproduce. Beginning as single, simple cell-forms, adapted to the conditions of the primitive earth, changes in the form and structure of life became necessary as those conditions altered. The simple cell organism gradually became more complicated through the development of specialized parts of its protoplasm. Differentiation within the single cell resulted in the formation of potential organs, in the form of vacuoles, cilia and flagella. Finally there arose the multicellular organism, and with it sexual reproduction came into existence. Through invertebrate, fish, amphibian, reptilian, bird and mammalian forms of life successively rose the life-structure, to the higher ape-forms and ultimately man, who represents at the present moment the culmination of this evolutionary process, by virtue of the greater complexity of development of his central nervous system. Whether this process of evolution will cease with man we cannot say. What

response life will make to further changes in the environment is beyond our comprehension. If these changes become so marked that the human race cannot endure, then the thread of evolution may be taken up by some other form of life more adaptable to such changes. We are not even sure that there has been a continuous progression from a single earliest form of life; it is possible that there were different periods of creative activity, in which different forms of primitive life arose, and that from these different forms there have persisted different lines of ascent. Be that as it may, the essential facts of an evolutionary progression of life from lower to higher forms cannot be doubted by any thinking mind. The evidence of this fact is present in the world about us to an overwhelming degree. Geologic, biologic and anthropologic evidence all attest its validity. The law of evolution has become a fundamental doctrine of modern science and philosophy. Its truth was dimly perceived by the primitive writer of the book of Genesis in the account

of the creation, which was not accomplished at one fell stroke, but required six days, or epochs, for its completion, proceeding from lower to higher forms. Life then is a continuous progression or adaptation, a continuous conquering of the environment, a progressive victory of animate over inanimate nature. We, who are alive on the earth at this given moment, represent the summation of this victorious progress of life through the countless ages of slow ascent and adaptation. Shall we take part in this immortal evolution of life, or allow our lines of ascent to terminate with our individual existence?

IV

As Man projects his mind upon the Universe about him, in an effort to penetrate and understand its mysteries, he is confronted with the workings of Law. His intellectual life is expended chiefly in an effort to interpret this law in terms of his own. It is no haphazard universe: its workings are not those of fortuity, but can

be interpreted in exact mathematical terms, the laws of energy and matter. In every manifestation of the material universe man finds the workings of these laws. They are revealed in what we can comprehend of the nature of electrons and atoms, and of the structure of the elements. In the fact that two atoms of hydrogen combine with one of oxygen to make water there lies a foundation for a philosophy of living. The universe is built upon *law;* it is the expression of law, immutable and inexorable. And to this law, we, as well as everything else in it, must conform. We also are but expressions of it, as are all other forms of energy and matter. But what an assuring comfort it is to man's mind to realize that the phenomena and workings of the world about him proceed in response to law, and that there can be no such thing as chance; for what may seem in our ignorance to be but pure fortuity is but the result of the working of the law. To Man's agonized questionings of the Universe about him

there comes no proof of the existence of an anthropomorphic God. Only the Law is revealed to him. No personal God discloses himself in material form; belief in such is founded only upon faith. What lies behind the Law, its origin, its meaning, its destiny, all are hidden from us. The educated mind replaces the conception of a personal God with the greater, but immaterial, conception of the Law. Call this what you will: God, Deity, Infinite Spirit or the Law, it matters not. The fact remains that the manifestations of the laws governing the Universe are alone revealed to us. But is this not sufficient foundation for a working philosophy of living! Does not the recognition of the fact that we find ourselves part of a universe, which is in itself an expression of law, give sufficient justification for an optimistic, yet rational and logical, outlook upon life! In the great scheme of things pure chance can play no part, can determine nothing. There is no blind destiny presiding over the course of events. All is determined, nay, predeter-

mined, and the great life of the universe proceeds inevitably, inexorably, yet harmoniously, in its eternal round.

V

Finding ourselves here, in a universe governed by law, what are we to do about it? The manifest answer to this is in the first place purely a sportsman's: make the best of it. And by making the best of it is meant the development of one's self to the fullest possible degree, physically, mentally and spiritually. The mere fact of existence surely entails that duty upon us. We are clearly not here for the mere pleasure of living, for such an epicurean view of the object of life does not satisfy the normal human mind, and all attempts at following such a philosophy end in bitter disillusionment. Then what is the object of life? Viewed from all standpoints there can be but one answer to this question, and that is the biologic one. Reduced to the ultimate analysis the function of the individual life is but the reproduction and evolution

of the species. Each living individual today stands at the head of an infinitely long line of evolutionary development. Upon him rests the responsibility of the continuance of that line, and the possibility of its further evolution. That this can be best accomplished by the highest possible development of each individual is sufficiently clear and rational. Evolution is the keynote of life in general, but each individual plays a part in the whole collective scheme, however infinitesimal that part may seem to be. The more highly developed the individual is, the more perfectly adjusted to his environment he is, the greater will be the influence he will exert upon the evolutionary process. Evolution may be made purposive and creative, as far as the human individual is concerned. It can be made still more so if all the individuals of a given race play a conscious rôle in the process. But can any individual influence the course of evolution! We must believe that he can, although we cannot evaluate the part he plays. That acquired characters

cannot be inherited has been the belief of the older biological school. Only here and there have opposing views been advanced. The very nature of the problem makes experimental demonstration of the transmission of acquired characters very difficult; but satisfactory proof has been recently offered. The pathologist, moreover, sees abundant evidence of the transmission of acquired pathologic characters; if pathologic qualities can be transmitted, why not physiologic or good qualities? After all, evolution has been accomplished only by means of the individual, who has separately forged each one of the long line of necessary links in the chain of evolutionary progress. It matters not whether this progress affects the chromosomes alone, or the cytoplasm; eventually both will be involved and the new quality become an essential fixed character of the germplasm. The individual must play a part, however minute, in establishing and fixing the changes incident upon evolutionary development, and which are the instruments

by which the latter process is brought about. Therefore, we support the thesis of the transmission of acquired characters. To our mind, evolution is impossible, if such be not the case. It is this principle which rationalizes the whole story of life, and is one of the chief foundation stones of our biologic philosophy. The more highly developed the individual becomes, the better the stock he will transmit and the better his evolutionary influence will be upon his line. It is evident, therefore, that if the chief law of life be evolutionary progress, then the first duty of the individual is to fit himself for the part which he plays in this great process. Upon the fullest development of the individual depends the fullest evolution of the race. If this thesis be not true, then the whole scheme of life becomes irrational and incredible, and no philosophy of life can be based upon it. But we are convinced of its truth, and believe that the historical moment has arrived when the intelligence of man can be applied to make evolution volitive and creative.

VI

The reproduction of the species is, therefore, the biologic aim of life. The individual exists but for the purpose of carrying and modifying the germ-plasm, which has been made potentially immortal through his continuous renewal. It is only through this renewal that continuous adjustment to a changing environment has been made possible. The divine power inherent in protoplasm, by which it has been able constantly to rise above the conditions which have beset it at every stage of its progress, has been utilized only through the constant sequence of generations. Death for the individual became a necessary factor in this great evolutionary process. The individual became mortal: the life-stream of the germ plasm continues immortal. Each individual has an intrinsic life-limit, fixed by his heredity. This life-limit is determined primarily by the conditions necessary to secure the propagation of the given race. Viewed from a broad stand-point the individual is apparently only an incident,

a necessary one withal, in the progressive march of the species. Nature appears to be so careful of the type and so careless as to the individual. But this is only apparent, for the individual is carefully prepared for the part which he is to play as a temporary guardian of the immortal germ-plasm. He passes approximately a third of his existence in development and preparation for the exercise of his function of reproduction; another third is spent in the period of his maturity for the rearing and education of his progeny, while the final third is the period of his decline and involution to its ultimate termination in death. The whole of his living thus centers about the reproduction of a generation of new individuals, who will in turn reproduce their kind. The individual, therefore, plays a most important rôle in the general scheme of things. Without the fulfillment of his great function the stream of life carried by his body comes to an end. All of the preparation, through infinite ages of development, comes to naught. As we see it, the individual

who fails voluntarily to reproduce commits the unpardonable sin. He has failed in the most manifest duty laid upon him; he has denied the very reason for his own creation and existence. He has killed an immortal thing, through his failure to carry on. He has not played the game of life squarely. It matters not that we cannot see the end of the life-procession, that we have no knowledge of whither it is going, or of what the future evolution of life will be. The one thing we do know is that reproduction is necessary to the scheme, whatever that scheme may be. If we deny this, then the scheme fails, as far as our essential part in it is concerned. The only immortality we have any knowledge of is that of the germ-plasm. We live again in our children and in our children's children, and so on, apparently *ad infinitum*. Of a personal immortality of the individual we have no scientific proof. But what matters it, be there personal immortality or not, as long as we are so vitally concerned in this immortal stream of life which flows through

our bodies, and which we in our individual lives so vitally influence. Is there no inspiration to be derived from the knowledge that we have impressed ourselves indelibly upon immortal life, and in doing that, have achieved at least a sort of personal immortality? Can we not find adequate justification for our existence in this knowledge? Is not the individual part we play in this broad scheme of life sufficiently inspiring and thrilling to justify our living, and to offset all of its uncertainty and mystery! Surely no theological doctrine offered by any of the established formal religions can equal in inspiration that possessed by these great biologic laws of progressive creation and evolution. Do they not possess something of the divine? They have further a material basis of fact and truth that makes them intelligible and credible. They make a rational and logical appeal to the intelligent human mind.

VII

But the reproduction of the species means much more than the mere physical

sexual acts concerned therein! In the broad biologic scheme reproduction means first the preparation of the individual for parenthood, then the production of children, and their care and rearing through infancy and childhood to their maturity. It means practically all the essential facts of life: education, career, business or profession, the home, sex-partnership, and the education of the progeny. It is *the* business of life, and a life-business at that. Twenty to twenty-five years should be required in modern life for the proper rearing and education of each child. In the lives of one's progeny the individual should renew his own earlier life. By the time he reaches the peak of life his children should be in their adolescent stage. Through the close social contact between parents and children existing in the ideal family life at this time, the parents become re-educated and revivified. The greatest form of sex happiness becomes possible during this period, in the calm and happy satisfaction attendant upon the rearing of progeny that show themselves to be worth all the trouble.

The judicious cooperation of both of the sex-partners is essential to the successful accomplishment of this end. Marriage should be a well-organized partnership for the definite purpose of reproduction in its broadest sense. In order that the best results may be obtained, a limitation in the number of the offspring is not only desirable, but necessary from an economic standpoint. Few families today can properly rear more than three children, or four at the most. A certain degree of voluntary birth-control has always been practiced by the more intelligent and prudent of the race, and will continue to be practiced by those who desire the best results. The personal attention of the proper kind of mother, rather than that of another person, is also most desirable from the same standpoint of best results. Too many progeny dissipate the value and efficiency of such personal maternal attention, and the physical strength of the mother as well. The present economic conditions are prohibitive of large families, even were

they desirable from other standpoints. What one wishes to secure in this great business of reproduction are the best results possible, physically, mentally and morally, and such results are possible only with a limitation in the number of the progeny. Even without the economic handicap the average human pair of parents is able to do full justice to the small family only. Modern preventive medicine and hygiene have greatly increased the expectancy of life for the newborn child, hence there is no necessity for bringing an extra number of children into the world to make good for a possible loss. That the production of progeny is biologically the chief aim of our existence cannot be doubted by any one. The sexual urge which is the principal factor in its consummation forces man more or less blindly to this end. Everything that goes to make up our lives centers around the sexual sphere; the desire to be and to do, ambitions, ideals, and all the yearnings and strivings of the emotional and moral life are inseparably related to this primal

function of life. But the mere physical aspects of the sexual life do not suffice for man's happiness and sex-satisfaction, if there are no children; for the normal individual the result in such cases is ultimately dissatisfied satiety. The incomplete sexual relation, unproductive as to children, sooner or later comes to wreck. Inevitably the true biologic meaning of the sex-relation comes to the surface. The unhappy individual concerned in a childless relationship regards his position with dissatisfaction, even abhorrence or disgust. Too often the realization of the biologic meaning of life comes too late, after children are impossible. No greater unhappiness comes to man than the lonely passage into old age of that pair of sex-partners who have failed in playing the game of life squarely. Should they realize, as few of them do, that they have terminated the line of immortal life culminating in their bodies, would not their regret be greater at their failure to obey this primal law of recreation and furtherance of the germ-plasm? Failure in

the reproductive life—(not in the mere bringing of progeny into the world, but in its broader accomplishment)—constitutes today one of the chief causes of marital unhappiness and divorce. Sooner or later the unsatisfied and unhappy persons concerned, if they possess any normalcy at all, become more or less vaguely conscious that they have, in their denial of parenthood, or in their inability to achieve it, failed in their manhood and womanhood. To repeat, we exist but for this biologic purpose of furthering the immortality of the germplasm. In our individual lives we pass through the period of growth, preparation and education for the performance of the function of reproduction; then through the period of maturity in which the broad business of securing and rearing progeny is accomplished. When the latter has been achieved, the individual, no longer necessary in the scheme of things, gradually passes from the scene by means of that progressive involution which we term old age. Having fulfilled the function of his

generation, he passes to make room for the new one, which in its turn will evolve, mature and pass from the scene. Thus, *ad infinitum* goes the ceaseless round of generation following generation. To what end? For what purpose? Religion and philosophy can give no answer to these questions. Science alone can interpret life as a rational necessary process in terms of an evolutionary immortality.

VIII

Granted then, that reproduction is the main business of our existence, is it not desirable that it be accomplished intelligently and for the best possible results? Marriage, the formation of a sex-partnership for the achievement of this business, is a necessary institution for its safe-guarding. But the great majority of human beings go into this partnership more or less blindly, led chiefly by matters of personal attraction, convenience, propinquity or pecuniary considerations. Up to the present time the guiding criteria for

the establishment of the marriage relation have been beauty and sex-attraction on the part of the female, good family and the possession of wealth. These crude and primitive eugenic considerations have not proved wholly satisfactory, as far as the resulting progeny were concerned. It is true that the possessor of beauty must usually be of good health; and that the possession of family distinction and of wealth might mean personal ability and intelligence. But as the world has gone on it has become increasingly evident that such primitive marriage criteria as beauty, family and wealth are no longer in themselves indicative of the best results as far as the children are concerned. We know now that personal attraction may be coexistent with the most serious diseases, especially those of the central nervous system. We have learned that family position and social rank are often almost synonymous terms with racial deterioration and degeneracy, and that wealth may be obtained through dishonesty, force, cunning or oppres-

sion, qualities in themselves of the most undesirable character. While in a primitive society these ancient criteria of sex-attraction and marriage-consummation might possess a definite eugenic value, this value today under the conditions existing in modern society becomes almost negative, or even positively non-eugenic, when they are considered as individual factors in their influence upon the moral and intellectual make-up of the children. The twentieth century has seen a tremendous advance in the knowledge of life and in the significance of the criteria for parenthood. During the last forty years the science of heredity has been achieved and placed upon a working basis in its practical applications to the problems of society. This advance led naturally to the development of another science, that of eugenics. It is upon this foundation that new criteria as to the formation of sex-partnerships and the production of children are being evolved and find utterance in wholly new formulae. Since the introduction of the

principle of evolution into man's philosophy, there has occurred nothing of such tremendous import to the human race as the newer knowledge of the inheritance of disease and the transmission of abnormal characters in the germ-plasm. Perhaps the most radical change of viewpoint developing out of these relatively new sciences of heredity and eugenics has been that concerning the essential value of individual protoplasm, or to be more specific, of the individual germ-plasm. Ancient views as to the brotherhood of man and the equality in value of all living individuals have received deadly blows and are being rapidly displaced by those that assert the unequal value of germ-plasms. To the scientific mind of today what greater untruth can there be than that expressed in the statement in the Declaration of Independence that all men are created free and equal. We know today that no two living human individuals are exactly alike or have an equal protoplasmic value. Some protoplasm is of a high quality, other is mediocre, while much

of that existent at the present time is below par. And as to the freedom of the individual, the latter is bound in myriad ways by his heredity and, to a lesser degree, by the chains of his environment. Only one form of freedom is vouchsafed him by this same Declaration of Independence, and that is the chance to make the best of the opportunity offered him in the combination of his heredity and environment. Nature deals each human being a hand of cards consisting of inheritable characters; within certain limits set by the law of the game, he can play this hand to the best of his ability. There is no luck or chance involved in the determination of the characters dealt out, they are fixed by the immutable laws of heredity; the environment determines the value of their action and reaction. Our progeny are, therefore, chiefly the result of the combination of characters inherent in the stock of the parents from whom they came; and the value of their resulting protoplasm is determined by heredity plus the environment. Their individual

values will vary according to the assemblage and combination of the characters in the maternal and paternal germ-plasms. According to the laws of heredity, there will come from the same parental germ-plasms progeny differing in character and value. But if the parental stocks are wholly sound, and under the same environment, the products of these combinations will also be wholly sound, although showing individual variants in the resulting constitutions. Each human individual is made up of three component factors, the morphological-physiological, the neuro-biochemical, and the psychological components. The individual constitution as well as the character and temperament are determined by the resultant of these three components. Heredity plays the chief part in the determination of the resultant individual, particularly is this the case with the first component factor; the other two factors are the more readily influenced or acted upon by the environment. For every human individual the sum total of these components with

their resultant actions and inter-actions constitutes a variation, which, if the heredity be normal and the environment favorable, will be within a range regarded as normal, but which will not correspond to any generic conception of the normal, because such does not exist. The concept of normal, as far as the individual human being is concerned, represents a pure abstraction. Variation as to the individual is another primal law of life; through it evolutionary progress is assured. But we have learned to distinguish between normal variations and those that are abnormal or pathologic in degree or kind. During the last thirty years our knowledge concerning the inheritance of abnormal conditions and diseases has increased tremendously. All of this knowledge has led to an increasing recognition of the vital importance to the race of the transmission of protoplasm below par in value. Through many clinical observations our knowledge concerning the inheritance of pathologic conditions has become so definite that we are able to predict unerr-

ingly the results of the marriage of individuals where family stocks show the presence of such abnormalities. Not only have we learned that disease is transmissible through the germ-plasm, but we have also acquired much information as to the manner in which hereditary transmission takes place. We know that some of the most serious affections of the central nervous system show a dominant inheritance and will appear in every generation of the family line so involved, no matter how normal and free from the given disease the intermarrying lines may be. One admixture alone of such a dominant inheritable pathologic character into the germ-plasm of a given line will ruin that line for many generations, if not forever. We do not know how long such a contamination of germ-plasm may persist, whether the affected line eventually will die out, or whether the germ-plasm may ultimately return to normal. We believe that there is a persistent tendency of germ-plasm to restore itself and to throw off abnormal qualities; but such a recovery

may require many generations for its accomplishment. On the other hand, some abnormalities exert a lethal action upon the germ-plasm; the affected line dies out at once when two lines of germ-plasm carrying this abnormal character come together. In other lines there results a gradual progressive deterioration, eventually leading to the extinction of the affected line; while other lines drag out an unhappy existence through the generations. The world is full of the latter type, possessors of tainted germ-plasm, far below par value, hindering the general development of the race, entailing enormous economic cost to society, unhappy in themselves and causing unhappiness to others. These are the family lines that produce the feeble-minded, the neuropathic and the insane; from them come the failures in life, the ne'er-do-wells, the down-and-outs, the drunkards, dope-fiends and prostitutes, suicides, the criminal and unproductive classes. And apparently after centuries of established formal religions this class of abnormal germ-plasm is steadily

increasing in numbers. Sufficient commentary upon their inadequacy to meet the really important facts of life! Race-betterment societies are emphasizing, on the one hand, the extension of the expectancy of life, and, on the other hand, bewail the fact that the normal educated classes show a steadily falling birth rate. Society finds itself confronted with this most serious problem: if the extension of the expectancy of life only increases the number of the unfit who survive to mature life to procreate their kind, what is the use in saving them to add to the economic encumbrance which already has brought society almost to the breaking point! Is it not apparent that there are too many people living now without whom the world would be very much better off! Society can barely stand the economic strain of caring for its defective members, in the provision of adequate hospital, asylum and prison facilities. We are constantly shocked by the horrible crimes committed by defective individuals of below par value, who have

been permitted to live their danger-laden lives unmolested and in full personal liberty. At the present moment Society is able to take care of only a small part of such potential criminals. What if the time should arrive, and this is not an impossible or improbable danger, when the number of below-par members of society exceeds the number of par or higher-than-par values? What fate would then await the human race, when the defective and criminal classes so exceed the normal that they become the predominating power and the rulers of human society? What will offer then, but chaos, anarchy and crime as the normal phenomena of a race below par value? What possible end for such a race can there be but progressive deterioration and eventual extinction? Have we in certain parts of the world not already reached such a state of danger? Such would of necessity be the ultimate fate of a communistic government which is founded upon the conception of individual equality in values. Since the latter does not exist in the scheme

of Nature, only those human societies which are founded upon the perception of scientific truths will be able to maintain themselves indefinitely. And Science teaches with full authority and conviction the primal principle of the inequality of existent individual germ-plasms, and the necessity for variation in the individual if evolution is to continue. The establishment of a communistic state, were such to persist, would mean ultimately the end of evolutionary development, as it has in the case of certain animal species. The keynote of modern medical philosophy and science is the recognition of the individual variant, as shown in the constitution, character and temperament. No two human beings are exactly alike, either in health or in disease. Both states show variations, based upon the individual constitutional resultant. There can be no absolute generic conception of either the normal or the abnormal as far as human life is concerned. The normal represents a certain range of individual variation advantageous to the species;

departures outside this range disadvantageous to the species fall within our concept of disease. The physician in practice must take cognizance of the variations in protoplasmic values. Both the diagnosis of disease and its treatment depend upon such a recognition of biologic facts.

IX

If the reproduction of the species is the chief aim of our temporary existence upon this earth, why does the human mind not treat this fact seriously and scientifically, and breed the species for the best possible results? It seems an extraordinary fact that civilization has just arrived, or is just arriving rather, at the point when serious and sober discussion of the facts involved in the necessary continuation of the species is possible. Since we have only in the last thirty years acquired a knowledge of the major facts of heredity and of the nature of the germ-plasm, it is not to be expected that a very large number of human beings are as yet in possession of these facts, or are so con-

vinced of their truth, that they are willing to be guided by them in the chief actions of their lives. But to the better educated of the race this knowledge has come understandingly, with full appreciation of both its individual and broader social meaning; and practical application of the principles involved is already taking place. The active part which the intelligent portion of the public is beginning to display in the matter is shown by the intense interest manifested in the discussions of marriage, divorce, sterilization, birth-control and allied questions concerned more or less intimately with the problem of racial reproduction. Opposition to the promulgation of these scientific truths comes only from the established conventional religions; instead of taking the lead towards the betterment of the race through the practical application of such truths to the actual business of living, they only delay through their opposition the eventual day of their general acceptance. Still history will repeat itself; truth cannot be disposed of by fiat, decree

or even laws passed for such purpose, but will eventually emerge victorious over non-intelligent and unscientific opposition, as it has always done in the past. To those whose minds are free and unshackled by superstition and irrationalism, does not the science of practical eugenics appeal most forcibly as offering the solution of the most important problems affecting the welfare of the human race! Can one not grasp it as presenting a rational, logical philosophy of life, wherein all other philosophies have failed! If this be so, as we believe it to be, should not the ancient out-lived criteria for the choosing of a sex-partner in parenthood be replaced by new criteria based upon the newer knowledge of heredity? Shall not the knowledge of the hereditary transmission of both normal and abnormal qualities in the germ-plasm and the variation in value of different family stocks replace the old blind and illogical factor of sex-attraction? To do so would mean after all the exercise of the highest kind of sex-attraction in reality; for it would mean an attraction

based upon the essential qualities of fitness for fatherhood and motherhood. Is this not the highest type of sex-romance? Certainly it is based more securely, than any other form of so-called romantic attraction between the sexes, upon the essential biologic facts underlying the sex union. Does it not become, therefore, the highest possible form of sex love, in that it is the expression of the highest form of altruism towards the children and the children's children? And the sex-mate is chosen on such a criterion, as being the most worthy to become a partner-parent. Human society has gone blunderingly on since the days of emergence from savagery, reproducing in a more or less instinctive manner, without the help of any guiding scientific knowledge. The value of the stock in determining the character of the descendants has, however, been more or less dimly recognized in many folk-words and sayings, such as: "Like begets like"; "Like father, like son"; "Chip of the old block"; "Good stock", and "Bad stock." But only in the most general way has there been any

practical application of vaguely recognized truths. Personal attraction has always played the major rôle in the determination of the choice of a sex-partner. This criterion should now be replaced, or amplified, by our newer knowledge of the value of the individual germ-plasm. The latter should be the first matter for consideration in the choice of a mate. Only when this criterion is satisfied, should other factors of sex-attraction, personal beauty, social position or wealth be considered. It is only a question of time when the criterion of *fine germ-plasm* will predominate over all others in the question of marriage; even now eugenic marriages are rapidly increasing in number. Given two healthy, well-educated and good principled individuals coming from healthy stocks in which no inheritable race-deteriorating qualities have appeared for several generations, their union for the purposes of reproduction is as safe for the progeny as can be made possible. And it is for the progeny and their future that we are chiefly concerned. Sex-partners should understand that

their union should mean this thing above all other matters, and that they do not marry for the selfish enjoyment of each other, but that their married life is to be primarily concerned with the great business of getting children and giving them a better chance than the parents had, in order that they may successfully meet the requirements of a later generation. This is the true function of the sex-union, and it is also true that in fulfilling this function, the greatest sex-satisfaction and sex-happiness possible to the married pair are achieved. Only those marriages are permanently successful and happy in which the children are the first and chief consideration. But what of those to whom the opportunities of marriage and parenthood are denied? Many of the best type of potential mothers are thus lost to the race. The man or woman who cannot achieve marriage or parenthood can, nevertheless, assume a parent's duty to other children lacking their own parents' care. Abundant opportunity is offered in the world about us for such vicarious parenthood. It becomes

the duty of the childless to seek out children who have lost their parents and assume the latter's place and function. It is essential, however, that children so adopted be chosen eugenically, with due regard to the character of their inheritance.

X

The monogamic marriage constitutes the ideal marriage relation for the most successful accomplishment of the marriage function, and to be successful it must be a permanent relation, lasting throughout the lives of the two individuals concerned. The proper rearing of three or four children requires an ordinary lifetime; and happy is he, who, after his offspring have been successfully reared, lives to renew his youth in his grandchildren for the few remaining happy years of his old age. The continuation of the sexual function through the later years of middle life and early period of decline constitutes a definite social bond in holding the parents together after children have been secured and developed to the point

at which they may become independent. Moreover, the highest form of sex-satisfaction comes towards the end of life in the realization of having fulfilled one's biologic function and that the results in progeny have justified one's individual existence. There is a peculiar happiness that arises out of the consciousness of having played the game of life biologically right. On the other hand, the progeny need the advice and counsel of the parents up to the period of their own entrance into maturity, and even afterwards. The contrasting physiology of the maturing and matured mind makes the two complementary to each other in the family relationship; and in the ideal family life constitutes one of the strongest factors in the integration of society. Permanency of the marriage relation is, therefore, necessary to the successful business of reproduction, aside from all matters of sentiment. Trial or temporary marriages can only be detrimental and deteriorating to the race, both from the moral standpoint and the loss of time in the achievement of the

biologic function. The business of marriage should occupy the whole of our mature lives; it should not be entered into lightly, nor should it be permitted to be easily dissolved. Control of marriage should be exercised by the State before the marriage is consummated, and not afterwards. Only those marriages should be permitted which promise eugenic results. The only criteria for these should be good inheritance, free from the more serious race-deteriorating inheritable diseases, particularly those affecting mentality and morals, and freedom from race-deteriorating acquired diseases, syphilis in particular. Divorce is a remedy applied to the wrong end of the problem; it should be made much more difficult. Such petty and childish causes as "incompatibility" should not be recognized as constituting sufficient grounds for separation. Only "compatible" people should be allowed to marry, and compatibility is wholly a matter of character, good taste and training. When the real object of marriage is once recognized, and the false sentiment attending the part played in it by

the individual is abandoned, when marriages take place through the influence of the "higher romance," with a biologic understanding of their function, then only may we hope for the best results in human breeding, and only then will there be a decrease in the crop of mental and moral defectives which the present method of marriage is producing at an increasing rate. Most of the unhappiness in life, and the major portion of its tragedies are the result of sex-failures, of ignorance concerning and lack of preparation for the real business of life, marriage and parenthood. Our schools and universities do not prepare one, except indirectly, for this great function. The majority of students do not study biology, and acquire no sense of the real biologic meaning of marriage. What is urgently needed is the proper instruction of our young people in the broad biologic aspects of this greatest of all duties of life. Efforts at reform of existing conditions begin only too often at the wrong end of the matter. Much is being said today of "birth control" as a remedy for the

threatening social disaster. Surely this propaganda is more fraught with danger than would be propaganda for "better children." The proper conception and practice of birth control will naturally follow the proper regulation of marriage and the development of a eugenic philosophy. It would be far easier to regulate the uneugenic production of children through restriction of marriage or sterilization, than to attempt to teach the unfit for marriage methods of contraception. This unfit class will not practice such methods voluntarily or with wisdom; the ones most in need of birth control, they will be the ones to employ its methods to the least degree. As a matter of fact birth control will be exercised only by the more intelligent classes; their families will be limited in number, as they have been in the past; but in the case of the defective family unrestricted breeding will go on as before, and only sterilization or restricted marriage can solve the problem. As we have previously pointed out, this situation may ultimately prove disastrous to the race, since

with this senseless multiplication of the unfit is joined another factor much lauded by unthinking advocates of modern hygiene and preventive medicine. The increase in the expectancy of life affects very largely the very class the world can best do without. It is certain that modern preventive medicine in increasing the expectancy of life is causing an increase in the number of the unfit who survive to maturity and propagate their kind. This is an interference with the law of natural selection, and this interference will continue to be operative with ultimate bad results until the practical application of the science of eugenics is accepted by the race. For the further protection of the institution of marriage, divorce should not be made easier, but should be granted only for failure in parenthood, whether this failure be due to physical or psychical qualities. Our present divorce system can lead only to racial degeneration. It strikes at the very foundations of the primal function of the reproduction of life. In many instances divorce is but the means

to the establishment of temporary concubinages, without desire or the hope for children; and such sex-relationships must be regarded as biologically abnormal and anti-racial. In those cases of divorce in which there are children still more serious non-eugenic situations are created. It is the children who are usually sacrificed to the selfishness of the parents. What greater harm can be done to the child than to subject him to the emotional stress and strain attendant upon the separation of the parents. Yet many parents are apparently so abnormal, that they lack the primitive biologic instinct of parenthood, and willingly sacrifice their offspring to their own caprice. The argument is often advanced that the emotional harm done to a child through the bickerings and quarrels of "incompatible" parents is greater than that resulting from the divorce of such parents. The writer does not agree with this view, since the child of divorced parents is stranded emotionally, and is usually uncared-for, becoming the victim of his surroundings. The semblance of a

family state, no matter how unhappy, is better than its total absence, A better remedy for divorce would be an emphasis laid by the State upon marriage as the highest civic duty. The contracting parties should be made to feel their responsibility to the State. A divorce should be regarded as a confession of failure in manhood and in womanhood; and an individual who so fails in the sex-relationship should not be lightly allowed to contract another such relationship. Stricter laws as to the remarriage of the divorced would certainly aid in restraining this great evil. The State should require eugenic marriages, and prevent non-eugenic ones. No individual should be allowed to produce children, who possesses a germ-plasm so seriously below par as to make of him an undesirable citizen. This would be, at least, attacking the problem at its source-end.

XI

The acceptance of a biologic principle of life means also the acceptance of a new

conception of sin. Biologic duty means also in the negative biologic sin. Anything that would interfere with, or be opposed to the successful carrying out of this biologic program, in the form of any voluntary positive or negative act, must be regarded as a biologic sin. Therefore, the failure to make the most of one's self in the preparation for parenthood, the failure to have children and to make them better than one's self would constitute the major sins as far as this philosophy of life is concerned. The Mosaic Decalogue still retains all of its value as the foundation of human law, and any breaking of any one of the ten commandments is as much of a sin, from the standpoint of biology, as when accepted as representing divine laws revealed to man through the agency of Moses. For the collective mind or genius represented by Moses was essentially a primitive biologic mind. In the Mosaic Law, which was founded essentially upon racial hygiene, there are found the primal laws of race preservation. Moses was the greatest

teacher and philosopher of the ancient world, for he was the first great hygienist, and founded the ancient Jewish religion pre-eminently upon hygiene. Surely the rite of circumcision must have originated in purely hygienic considerations. We may say that the modern scientific laboratory has been making good for Moses, in furnishing a scientific foundation for many of his laws and commandments. Surely the Mosaic conception of the evils of fornication and adultery for the Jewish race must have had a very definite hygienic basis in the minds of the primitive law-givers, and modern medicine has shown this to exist in the dangers of venereal disease, the greatest of all race-deteriorating factors. Purity in the sexual life is an absolute essential to the continued health of the race. This truth was fully perceived by Moses, but it remained for the twentieth century to give an adequate scientific foundation to the law regulating the sexual life. Sexual sins become, therefore, biologic sins of first importance in their significance for the

health of the progeny and the welfare of the race. And for biologic sins there can be no forgiveness, no blotting out of the inevitable consequences. Sexual transgressions receive the most severe of Nature's punishments, in the safe-guarding of the reproductive function. Sterility, death, transmitted infection or a blastophthoric effect in the offspring, the reactivation of the disease process long years after its acquisition, insanity and myriad forms of organic disease constitute the harvest of sexual transgression and biologic sin. Innocent and guilty suffer equally in the punishments attendant upon sins against the reproductive function. It is in this connection that we see especially the tragedy of deferred punishment for sins supposedly forgiven or almost forgotten. From a biologic standpoint the doctrine of the forgiveness of sins has been productive of great harm to the human race. No matter how earnestly a man may regret a transgression and delude himself into a state of mind that his sin is forgiven and all consequences of it abrogated, yet the infective agents of

venereal disease may persist in his body throughout the years, to be transmitted to wife and children, poisoning the very source of life, even bringing his germ-plasm to an untimely and unhappy end. Can any sense of a sin forgiven in the spiritual sense remove the spirochetes of syphilis from a man's body, or the gonococcus from the woman's oviduct! But the idea of a possible forgiveness for sins committed early in life through a not-too-late repentance has undoubtedly had the effect of encouraging men to sin, and then to be forgiven. Scientific medicine points out the fallacy of this belief, particularly in regard to sins against the reproductive function. For murder Nature has no direct punishment, for the racial sin she has the most severe. The voluntary exposure of the individual to any form of infection or intoxication that may affect the vitality of his germ-plasm must be placed in the same category of biologic sin. Such blastophthorias as the alcoholic, continue to show themselves in the progeny for successive generations; they in truth

represent acquired abnormal qualities of the germ-plasm that have become transmissible. With this knowledge is it not incumbent upon man to keep his body free of all infection or intoxication, in order that he may pass on the immortal germ-plasm in as healthy, or healthier state than it possessed when it came to him. Each man should be held responsible for the condition of his own germ-plasm, as he should also be for the choice of that with which he will unite his to produce his offspring. Moses knew nothing of heredity or the germ-plasm. Had he possessed such knowledge would he not have included in the Decalogue some such commandments as these "Keep thy seed pure and undefiled, that thy children may live long and happily in the land after thee," or "Mix not thy seed with that of an inferior race, lest thy children suffer and thy hopes be in vain"? If the knowledge gained through modern scientific investigations has any value at all, surely that value should consist in the practical application of scientific knowledge to the conditions

of actual life. The knowledge that cannot be so applied cannot be real truth. It is only the truth that sets us free that counts after all; and the knowledge that does not help us towards the freedom of the spirit and of the will is but vanity.

XII

We have attempted to develop the thesis that modern biology can furnish us with the material for a sound and satisfactory philosophy of living, adequate to the demands of a certain type of mind, the educated and the scientific, that requires concrete material as a foundation for its faith. As our knowledge of the nature of the Universe has grown, we have become more and more convinced of the Law and its operation in relation to our own infinitesimal lives. In the unity of all energy and matter, in the continuity of life and the immortality of the germ-plasm, in the principles of heredity and the progressive evolution of life, we can see a logical and rational answer to the age-old questions of Whence, Whither

and Why. Out of this we may formulate a philosophy of life, or a religion, that serves to activate and motivate life sufficiently satisfactorily, and to give courage and joy in living. It is a philosophy of the individual, ultimately submerged in the race, and living for the race primarily. It is a philosophy of self-development to the highest possible degree; and it is a philosophy of the most complete self-abnegation, as far as its ultimate purpose is concerned. It substitutes race-immortality for personal immortality; it is at once the supreme expression of personal individuality and of personal self-sacrifice. In the highest possible sense the individual lives for his children and for them alone, and in so doing accomplishes his highest biologic function. It is a philosophy devoid of formal conventions. It employs no dependence upon faith. It is free from superstition and fear. It seeks no personal reward beyond the satisfaction of fulfilling one's duty to life. Its foundation is knowledge, and its practice is the game of life.

CREDO

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I BELIEVE IN THE LAW · IN THE IMMORTALITY OF THE GERM PLASM AND IN THE CREATIVE · PROGRESSIVE EVOLUTION OF LIFE · IN THE VARIABILITY OF VALUE OF THE GERM PLASM THROUGH HEREDITY & ENVIRONMENT · IN THE TRANSMISSION OF ACQUIRED CHARACTERS · AND IN THE CONSCIOUS IMPROVEMENT OF THE RACE THROUGH THE LAWS OF VOLITIVE EUGENICS ·· I BELIEVE THAT THE AIM OF THE INDIVIDUAL LIFE IS THE PROTECTION · IMPROVEMENT AND CONTINUATION OF THE IMMORTAL GERM PLASM · AND THAT THIS IS BEST SECURED BY SELF-DEVELOPMENT IN THE HIGHEST POSSIBLE DEGREE · THROUGH A PERMANENT MONOGAMIC SEX-PARTNERSHIP · WITH LIMITATION OF OFFSPRING TOWARDS THE SECURING OF THE BEST POSSIBLE RESULTS IN THE PROGENY · AND THEIR BEST PREPARATION FOR THE CONTINUATION OF THE PROCESS IN THE NEXT GENERATION ·· IN THIS BELIEF · THE UNIVERSE IS RATIONALIZED FOR MY INTELLIGENCE AND REASON · I ACCEPT IT WITH OPTIMISM · RELINQUISHING ALL DESIRE FOR A PERSONAL IMMORTALITY · AND · UNAFRAID · BELIEVING THAT WHATEVER GODS MAY BE · THE GAME OF LIFE WILL HAVE BEEN PLAYED SQUARELY AND ACCORDING TO THE LAW

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76 Fifth Avenue
New York, N. Y.

C0-BVV-300